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Effects of Multiple Recycling on the Structure and Morphology of SEBS/PP Composites

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Abstract

A study of the chemical, mechanical, rheological, and morphological properties of recycled styrene-ethylene-butylene-styrene/polypropylene (SEBS/PP) composites was performed to investigate the viability of the application of these materials as recyclable halogen-free alternatives to plasticized poly(vinyl chloride). The SEBS and PP were initially compounded in a ratio of 3:7 and repeatedly recycled. After over ten rounds of recycling, the SEBS/PP composites exhibited no significant changes either in tensile strength or in tensile elongation. However, a reduction in hardness, decrease in the temperature of the onset of thermal decomposition, and significant increase in their melt flow index (MFI) values were observed. Notably, X-ray scattering measurement and transmission electron microscopy experiments of the SEBS/PP composites indicated that these changes in hardness and MFI originated from morphological changes of the SEBS/PP composites resulting from thermal degradation of the SEBS triblock copolymers that occurred over multiple rounds of recycling.

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